

Sheet 9 (Interactive graphics programs)

1. Write An OpenGL program that draws a rectangle when the user left clicks the mouse when being on the graphics window. Implement a simple menu for your program. The menu should have three choices

- The first is marked “Quit” and is used to quit the application
- The second is marked “Increase square size” and is used to increase the size of the drawn square
- The third is marked “Decrease square size” and is used to decrease the size of the drawn square

You are free to choose the initial size of the square and the amount by which the square size decreases/increases.

2. In the context of OpenGL programming, explain the following

- a) Picking
- b) Interactive modeling

3. If you know the following:

The two-dimensional point (in a Cartesian coordinates): $x = \cos(\theta)$, $y = \sin(\theta)$ lies on a unit circle regardless of the value of θ . Also, the three points $(-\sin(\theta), \cos(\theta))$, $(-\cos(\theta), -\sin(\theta))$, and $(\sin(\theta), -\cos(\theta))$ lie on the unit circle. These four points are equidistant along the circumference of the circle. By connecting the four points we get a square that has a side length of $\sqrt{2}$. This is true for any value of θ

Write an OpenGL program that draw a rotating square using the above information

4. Mention some possible reasons that could lead to flickering or to the appearance of artifacts when executing an OpenGL program

5. Report: Simulate a bouncing ball in two dimensions incorporating elastic collisions with a rough surface. You can model the ball with a closed polygon that has a sufficient number of sides to look smooth.